

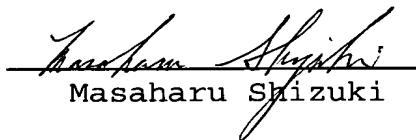
D E C L A R A T I O N

I, Masaharu Shizuki, c/o Ohshima and Company, BN GYOEN Building, 17-11, Shinjuku 1-chome, Shinjuku-ku, Tokyo, Japan do solemnly and sincerely declare as follows:-

1. I am well acquainted with the Japanese and English languages.
2. The following is a true translation into the English language about the certified copy of Japanese Patent Application No.2003-383824 in respect of an application for Letters Patent filed with the Japanese Patent Office on November 13, 2003.

And I make this solemn declaration conscientiously believing the same to be true.

dated this 29th day of January, 2009



Masaharu Shizuki

[Title of Document] Patent Application
[Reference Number] P03KY00007
[Date of Filing] November 13, 2003
[Addressee] To: Commissioner, Patent Office
[International Patent Classification] C01F 11/02
[Inventor]
[Address] c/o Kyowa Chemical Industry Co., Ltd.,
305, Yashimanishimachi, Takamatsu-shi,
KAGAWA
[Name] Takafumi Suzuki
[Inventor]
[Address] c/o Kyowa Chemical Industry Co., Ltd.,
305, Yashimanishimachi, Takamatsu-shi,
KAGAWA
[Name] Masatoshi Matsushima
[Inventor]
[Address] c/o Kyowa Chemical Industry Co., Ltd.,
305, Yashimanishimachi, Takamatsu-shi,
KAGAWA
[Name] Seiji Miyauchi
[Patent Applicant]
[ID Number] 000162489
[Name] KYOWA CHEMICAL INDUSTRY CO., LTD.
[Attorney]
[ID Number] 100080609
[Patent Attorney]
[Name] Masataka Ohshima
[Appointed Attorney]
[ID Number] 100109287
[Patent Attorney]
[Name] Taizo Shiraishi
[Identification of Fee]
[Prepayment Registry Number] 006954
[Amount of Payment] ¥21,000

[List of Items Filed]

[Title of Article] Claims 1

[Title of Article] Specification 1

[Title of Article] Abstract 1

[Number of General Power of Attorney] 9717262

[Title of Document] Claims

[Claim 1]

Calcium hydroxide compound represented by the following formula (1):



(wherein n represents an integer of 1 to 4, x represents a number of 0.001 to 0.2, and A^{n-} represents an anion derived from at least one compound selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid.)

[Claim 2]

The calcium hydroxide compound of claim 1, wherein A^{n-} is SiO(OH)_3^- , Al(OH)_4^- , Cl^- , NO_3^- , H_2PO_4^- , $\text{C}_6\text{H}_7\text{O}_7^-$, $\text{SiO}_2(\text{OH})_2^{2-}$, $\text{Si}_2\text{O}_6(\text{OH})_6^{2-}$, HPO_4^{2-} , $\text{C}_6\text{H}_6\text{O}_7^{2-}$, PO_4^{3-} , $\text{C}_6\text{H}_5\text{O}_7^{3-}$, $\text{Si}_4\text{O}_8(\text{OH})_4^{4-}$ or a mixture thereof.

[Claim 3]

Calcium hydroxide compound obtained by:

(i) causing calcium oxide to undergo a slaking-reaction in water, or

(ii) causing a water-soluble calcium salt to react with an alkali metal hydroxide, in the presence of at least one compound selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid.

[Claim 4]

The calcium hydroxide compound of claim 1 or 3, wherein the silicon-based compound is at least one compound selected from the group consisting of alkali silicate, a silicate, hydrated silicic acid, silicic acid anhydride and crystalline silicic acid.

[Claim 5]

The calcium hydroxide compound of claim 1 or 3,

wherein the silicon-based compound is silica (silicon dioxide).

[Claim 6]

The calcium hydroxide compound of claim 1 or 3, wherein the aluminum-based compound is at least one compound selected from the group consisting of an aluminum salt, crystalline aluminum hydroxide, and amorphous aluminum hydroxide.

[Claim 7]

The calcium hydroxide compound of claim 1 or 3, wherein the inorganic acid is at least one inorganic acid selected from the group consisting of hydrochloric acid, nitric acid, and sulfuric acid.

[Claim 8]

The calcium hydroxide compound of claim 1 or 3, wherein the organic acid is at least one organic acid selected from the group consisting of citric acid, tartaric acid, ethylenediamine tetraacetic acid, malic acid, succinic acid, and their salts.

[Claim 9]

The calcium hydroxide compound of claim 1 or 3, wherein the calcium hydroxide is synthetic lime.

[Claim 10]

The calcium hydroxide compound of claim 1 or 3, wherein a chlorine element content is not higher than 0.05 wt% and a sodium element content is not higher than 20 ppm.

[Claim 11]

Calcium hydroxide particles formed of the calcium hydroxide compound of claim 1 or 3.

[Claim 12]

The calcium hydroxide particles of claim 11, wherein the above particles have an average secondary particle diameter measured by a laser diffraction

scattering method of 0.1 to 10 μm .

[Claim 13]

The calcium hydroxide particles of claim 11, wherein the above particles have a BET method specific surface area of 5 to 40 m^2/g .

[Claim 14]

The calcium hydroxide particles of claim 11, wherein the above particles are surface-treated with at least one surface treating agent selected from the group consisting of (a) a higher fatty acid, (b) an alkali metal salt of a higher fatty acid, (c) a sulfuric ester of a higher alcohol, (d) an anionic surfactant, (e) a phosphoric ester, (f) a silane-, titanate- or aluminum-based coupling agent and (g) a fatty acid ester of a polyhydric alcohol.

[Title of Document] Specification

[Title of Invention] Calcium Hydroxide Compound

[Technical Field]

[0001]

The present invention relates to calcium hydroxide compound formed of a solid solution with a specific compound, and particles comprising the same.

[Background Art]

[0002]

Calcium hydroxide is apt to undergo crystal growth and hence, has a small specific surface area, because the solubility of quick lime in water is high. Studies to overcome the above problem are making progress, but satisfactorily large specific surface area has not obtained yet at present (refer to Patent Publication 1).

[Patent Publication 1] JP-A 2001-123071

[Disclosure of the Invention]

[Problem to be Solved by the Invention]

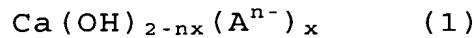
[0003]

The object of the present invention is to provide calcium hydroxide having a large specific surface area. Since calcium hydroxide particles of the present invention have a large specific surface area, they are expected to be used as an acid neutralizer, a halogen capturing agent or the like.

[Means for Solving the Problem]

[0004]

The present invention is a calcium hydroxide compound represented by the following formula (1):



In the formula, n represents an integer of 1 to 4, x represents a number of 0.001 to 0.2, and A^{n-} represents an anion derived from at least one compound selected from the group consisting of a silicon-based compound,

a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid.

[0005]

Further, the present invention also includes a calcium hydroxide compound obtained by:

(i) causing calcium oxide to undergo a slaking-reaction in water, or
(ii) causing a water-soluble calcium salt to react with an alkali metal hydroxide,
in the presence of at least one compound selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid. Further, the present invention includes calcium hydroxide particles comprising the above calcium hydroxide compound.

[Effect of the Invention]

[0006]

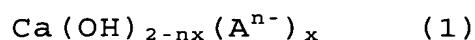
The calcium hydroxide compound of the present invention forms fine crystals due to inhibition of crystal growth. Hence, the obtained calcium hydroxide particles have a large specific surface area and are highly active and accordingly, are expected to be used as an acid neutralizer, a halogen capturing agent or the like.

[Best Mode for Carrying out the Invention]

[0007]

Hereinafter, the present invention will be further specifically described.

The calcium hydroxide compound of the present invention can be represented by the following formula (1).



In the above formula, n represents an integer of 1 to 4, x represents a number of 0.001 to 0.2, and A^{n-}

represents an anion derived from at least one compound (hereinafter may be referred to as "additive") selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid. Therefore, n is the valence of anion, x is an anion content, and nx is their product.

[0008]

Illustrative examples of a monovalent anion represented by A^{n-} ($n = 1$) include $SiO(OH)_3^-$, $Al(OH)_4^-$, Cl^- , NO_3^- , $H_2PO_4^-$ and $C_6H_7O_7^-$. Illustrative examples of a divalent anion ($n = 2$) include $SiO_2(OH)_2^{2-}$, $Si_2O_6(OH)_6^{2-}$, HPO_4^{2-} and $C_6H_6O_7^{2-}$. Illustrative examples of a trivalent anion ($n = 3$) include PO_4^{3-} and $C_6H_5O_7^{3-}$. Illustrative examples of a tetravalent anion ($n = 4$) include $Si_4O_8(OH)_4^{4-}$.

[0009]

As A^{n-} , a plurality of anions of different types. may be contained in the compound represented by the formula (1) simultaneously. In this case, a total of products of the valences and the contents of the respective anions is represented by nx . x is 0.001 to 0.2, preferably 0.005 to 0.15, more preferably 0.01 to 0.1.

[0010]

In other words, the present invention includes calcium hydroxide compound formed of a solid solution with at least one compound selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid.

[0011]

The silicon-based compound is preferably at least one silicon-based compound selected from the group

consisting of alkali silicate, a silicate, hydrated silicic acid, silicic acid anhydride and crystalline silicic acid (e.g., quartz). Silica (silicon dioxide) is preferred in particular. The phosphorus-based compound is preferably at least one phosphorus-based compound selected from the group consisting of phosphoric acid, condensed phosphoric acid, polyphosphoric acid and their salts. The aluminum-based compound is preferably at least one aluminum-based compound selected from the group consisting of an aluminum salt, crystalline aluminum hydroxide and amorphous aluminum hydroxide. The inorganic acid is preferably at least one inorganic acid selected from the group consisting of hydrochloric acid, nitric acid and sulfuric acid. The organic acid is preferably at least one organic acid selected from the group consisting of citric acid, tartaric acid, ethylenediamine tetraacetic acid, malic acid, succinic acid, and their salts.

[0012]

The calcium hydroxide is natural lime or synthetic lime. The calcium hydroxide compound of the present invention preferably has a chlorine element content of not higher than 0.05 wt% and a sodium element content of not higher than 20 ppm. The sodium element content is measured by an atomic absorption method, and the chlorine element content is measured by an absorptiometric method.

[0013]

(Calcium hydroxide particles)

The present invention includes calcium hydroxide particles formed of the above calcium hydroxide compound. The calcium hydroxide particles of the present invention have an average secondary particle

diameter, measured by a laser diffraction scattering method, of 0.1 to 10 μm , preferably 0.1 to 5 μm , more preferably 0.5 to 2 μm . The calcium hydroxide particles of the present invention have a specific surface area, measured by a BET method, of 5 to 40 m^2/g , preferably 10 to 30 m^2/g .

[0014]

(Production Method)

The calcium hydroxide compound of the present invention can be produced by:

- (i) causing calcium oxide to undergo a slaking-reaction in water, or
- (ii) causing a water-soluble calcium salt to react with an alkali metal hydroxide, in the presence of at least one compound selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid.

[0015]

That is, firstly, the calcium hydroxide compound (particle) of the present invention can be produced by a method described in Japanese Patent Application No. 2002-137581 applied by the present inventor. More specifically, the calcium hydroxide compound can be produced by causing quick lime (calcium oxide) to undergo a slaking-reaction in water containing at least one compound (additive) selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid. Suitably, quick lime is fed into water containing the additive of 10 to 60 $^{\circ}\text{C}$, preferably 30 to 60 $^{\circ}\text{C}$ under agitation to cause it to undergo a slaking reaction. The reaction temperature is increased by self-generating heat by

addition of quick lime and reaches 90°C or higher, for example.

[0016]

Secondly, the calcium hydroxide compound can be produced by causing an aqueous solution of a water-soluble calcium salt to react with an aqueous solution of an alkali metal hydroxide in the presence of an additive. More specifically, the calcium hydroxide compound can be produced by causing an aqueous solution of a water-soluble calcium salt such as calcium chloride or calcium nitrate to react with an aqueous solution of an alkali metal hydroxide such as sodium hydroxide or potassium hydroxide in the presence of at least one compound selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid. At this point, it is preferred that the aqueous solution of the alkali metal hydroxide is so made as to have an alkali equivalent which is equal to or higher than a calcium equivalent (preferably 1.05 to 1.3-fold equivalent). After the reaction, the obtained white precipitate is preferably aged under heating at about 60 to 150°C, preferably about 80 to 120°C, for 0.5 to 4 hours and surface-treated by an anionic surfactant or the like. Then, filtration, washing with water, drying, grinding, classification and the like can be selected as appropriate to produce the calcium hydroxide compound.

[0017]

Thirdly, the calcium hydroxide compound of the present invention can also be obtained by adding at least one selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an

organic acid to a calcium hydroxide particle suspension obtained by putting quick lime in water to cause the quick lime to undergo a slaking reaction and then aging the resulting mixture.

[0018]

The additive is preferably present in an amount of 0.01 to 7 wt%, preferably 0.05 to 7 wt%, more preferably 0.1 to 7 wt%, based on the calcium hydroxide to be produced. When the amount is smaller than 0.01 wt%, the specific surface area of the calcium hydroxide compound to be produced becomes small. Meanwhile, when the amount is larger than 7 wt%, the solid solution limit to calcium hydroxide is exceeded.

[0019]

In these production methods, it is not revealed what effect of the additive increases the BET surface areas of calcium hydroxide particles. However, it is assumed that it occurs because crystal growth is inhibited by the additive that acts as a crystal growth inhibitor.

[0020]

(Aging)

According to the above method, though calcium hydroxide particles having a large specific surface area can be obtained, calcium hydroxide particles of further higher quality can be obtained by aging the reaction mixture after the reaction. The reaction mixture can be aged at 60 to 170°C, preferably 80 to 120°C, most preferably 90 to 100°C, for 5 minutes to 3 hours, preferably 10 minutes to 2 hours, more preferably 20 minutes to 1 hour.

[0021]

(Grinding)

Further, after completion of the reaction or aging,

the obtained calcium hydroxide particles can be ground in a suspension by a grinding means such as a wet ball mill as required. Thereby, particles having an average secondary particle diameter of smaller than 2 μm can be obtained.

[0022]

(Surface Treating agent)

The calcium hydroxide particles of the present invention can be surface-treated with a surface treating agent known per se, as desired. The compatibility thereof with a resin or the like can be improved by the surface-treatment. Illustrative examples of the surface treating agent include at least one selected from the group consisting of (a) a higher fatty acid, (b) an alkali metal salt of a higher fatty acid, (c) a sulfuric ester of a higher alcohol, (d) an anionic surfactant, (e) a phosphoric ester, (f) a coupling agent (silane-, titanate- or aluminum-based) and (g) a fatty acid ester of a polyhydric alcohol.

[0023]

Illustrative examples of surface treating agents that are preferably used include:

- (a) higher fatty acids having 10 or more carbon atoms such as stearic acid, erucic acid, palmitic acid, lauric acid and behenic acid;
- (b) alkali metal salts of the above higher fatty acids;
- (c) sulfuric esters of higher alcohols such as stearyl alcohol and oleyl alcohol;
- (d) anionic surfactants such as a sulfuric ester of a polyethylene glycol ether, an amide bond sulfuric ester, an ester bond sulfuric ester, an ester bond sulfonate, an amide bond sulfonate, an ether bond sulfonate, an ether bond alkylaryl sulfonate, an ester bond alkylaryl sulfonate and an amide bond alkylaryl sulfonate;

(e) phosphoric esters such as acid and alkali metal salts and amine salts of a mixture comprising orthophosphoric acid and a monoester and/or diester of oleyl alcohol, stearyl alcohol or the like;

(f) silane coupling agents such as vinyl ethoxysilane, vinyl-tris(2-methoxy-ethoxy)silane, γ -methacryloxypropyl trimethoxysilane, γ -aminopropyl trimethoxysilane, β -(3,4-epoxycyclohexyl)ethyl trimethoxysilane, γ -glycidoxypropyl trimethoxysilane and γ -mercaptopropyl trimethoxysilane; titanate-based coupling agents such as isopropyl triisostearoyl titanate, isopropyl tris(dioctyl pyrophosphate)titanate, isopropyl tris(N-aminoethyl-aminoethyl)titanate and isopropyl tridecyl benzenesulfonyl titanate; aluminum-based coupling agents such as acetalkoxy aluminum diisopropylate, and

(g) fatty acid esters of polyhydric alcohols such as glycerine monostearate and glycerine monooleate.

[0024]

The calcium hydroxide particles can be surface coating-treated by a wet or dry process known per se. For example, in the wet process, a surface treating agent in a liquid or emulsion form is added to slurry of the calcium hydroxide particles, and stirred mechanically to a sufficient extent at a temperature up to about 100°C. In the dry method, the calcium hydroxide particles are stirred by a mixer such as a Henschel mixer, a surface treating agent is added in a liquid, emulsion or solid form, and they are fully mixed with or without heating. Though the amount of the surface treating agent can be selected as appropriate, it is preferably not larger than about 10 wt% based on the weight of the calcium hydroxide

particles. The surface-treated calcium hydroxide particles can be formed into a final product shape by appropriately selecting and performing means such as washing with water, dehydration, granulation, drying, grinding or classification, as required.

[Examples]

[0025]

Hereinafter, the present invention will be described in detail with reference to Examples. X-ray diffraction, a BET specific surface area and an average secondary particle diameter were measured in the following manner.

X-ray diffraction:

X-ray diffraction was measured by an X-ray diffraction method using the RINT2200V X-ray diffractometer of Rigaku Corporation.

BET Specific Surface Area:

A BET specific surface area was measured by a nitrogen adsorption method using the full-automatic surface-area measuring device MULTISORB 12 of Yuasa Ionics Inc.

Average Secondary Particle Diameter:

An average secondary particle diameter was measured by the MICROTAC HRA type laser diffraction scattering method particle size distribution measuring device of Nikkiso Co., Ltd.

[0026]

(Examples 1-1 to 1-3)

To a 3-liter beaker, 1.5 L of tap water and 0.3 wt% (0.9 g), 0.5 wt% (1.5 g) or 1.0 wt% (3.0 g) of hydrated silicon dioxide (CARPLEX #80, SiO₂ content: 95 wt%) of Shionogi & Co., Ltd. as a silicon-based compound were added based on calcium hydroxide to be produced. After the water temperature was elevated to about 60°C, 225

g of quick lime (CALCEED of Ube Material Industries, Ltd.) was added under agitation to cause a slaking reaction. Thereafter, the resulting mixture was agitated at 90°C for 30 minutes (the reaction temperature was increased to 90°C or higher by self-generating heat). After cooled, the resulting mixture was passed through a 200-mesh sieve, filtered, dehydrated, dried and ground. The X-ray diffraction pattern of the obtained powder showed only calcium hydroxide. Therefore, it was found that calcium hydroxide compound formed of a solid solution with silicon dioxide was produced. The BET specific surface area and average secondary particle diameter of the solid solution calcium hydroxide are shown in Table 1.

[0027]

(Example 2-1)

The procedure of Example 1 was repeated except that in place of the silicon-based compound, 2.5 wt% (7.5 g) of dried aluminum hydroxide gel (S-100, Al content: 28.6 wt%) of Kyowa Chemical Industry Co., Ltd. was used as an aluminum-based compound. The X-ray diffraction pattern of the obtained powder showed only calcium hydroxide. Therefore, it was found that calcium hydroxide compound formed of a solid solution with aluminum oxide was produced. The BET specific surface area and average secondary particle diameter are shown in Table 1.

[0028]

(Example 3-1)

The procedure of Example 1 was repeated except that in place of the silicon-based compound, 5 wt% (15 g) of sodium polyphosphate (sodium polyphosphate: 26 wt%, sodium metaphosphate: 72 wt%, anhydrous sodium pyrophosphate: 2 wt%) of ORGANO CORPORATION was used

as a phosphorus-based compound. The X-ray diffraction pattern of the obtained powder showed only calcium hydroxide. Therefore, it was found that calcium hydroxide formed of a solid solution with phosphoric acid was produced. The BET specific surface area and average secondary particle are shown in Table 1.

[0029]

(Examples 4-1 and 4-2)

The procedure of Example 1 was repeated except that in place of the silicon-based compound, 20 ml of 1 mol/L nitric acid or 20 ml of 1 mol/L hydrochloric acid was used as an inorganic acid. The X-ray diffraction pattern of the obtained powder showed only calcium hydroxide. Therefore, it was found that calcium hydroxide formed of a solid solution with the inorganic acid was produced. The BET specific surface area and average secondary particle diameter are shown in Table 1.

[0030]

(Examples 5-1 to 5-4)

The procedure of Example 1 was repeated except that in place of the silicon-based compound, 1.0 wt% (3 g), 2.0 wt% (6 g) or 3.0 wt% (9 g) of sodium citrate (content: 99 wt%) or 1.0 wt% (3 g) of tartaric acid (content: 97 wt%) was used as an organic acid or a salt thereof. The X-ray diffraction pattern of the obtained powder showed only calcium hydroxide. Therefore, it was found that calcium hydroxide formed of a solid solution with the organic acid was produced. The BET specific surface area and average secondary particle diameter are shown in Table 1.

[0031]

(Examples 6-1 and 6-2)

A calcium hydroxide suspension obtained by adding

0.5 or 1.0 wt% of hydrated silicon dioxide of Example 1 was put in a 1-liter autoclave to be subjected to a hydrothermal treatment at 120°C for 2 hours. After cooled, the resulting suspension was passed through a 200-mesh sieve, filtered, dehydrated, dried and ground. The BET specific surface area and average secondary particle diameter are shown in Table 1.

[0032]

(Examples 7-1 and 7-2)

After a calcium hydroxide suspension obtained by adding 0.5 wt% of hydrated silicon dioxide of Example 1 or 2.0 wt% of sodium citrate of Example 5 was heated to 80°C, 5 wt% of sodium stearate solution (80°C) was then added under agitation to surface-treat the calcium hydroxide. After cooled, the resulting suspension was passed through a 200-mesh sieve, filtered, dehydrated, dried, and ground. The sodium stearate was added in such an amount that could cover the surface of the calcium hydroxide by a monomolecular layer. The BET specific surface area and average secondary particle diameter are shown in Table 1.

[0033]

(Example 8)

A calcium hydroxide suspension obtained by adding 0.5 wt% of hydrated silicon dioxide of Example 1 was milled by using DYNO-MILL of SHINMARU ENTERPRISES CORPORATION as a wet ball mill at a glass bead diameter of 0.5 mm, a disk peripheral velocity of 10 m/s and a slurry feed rate of 250 L/h, filtered, dehydrated, dried and ground. The BET specific surface area and average secondary particle diameter are shown in Table 1.

[0034]

(Examples 9-1 to 9-3)

The procedure of Example 1 was repeated except

that aging (agitation at 90°C for 30 minutes) after completion of the slaking reaction was not performed. The BET specific surface area and average secondary particle diameter are shown in Table 1.

[0035]

(Example 10)

500 L of water was put in 2-m³ reaction tank, and 427 L of 3 mol/L sodium hydroxide, 4.0 L of 6.6 mol/L No.3 sodium silicate (3.3 wt% as SiO₂) as SiO₂, and 160 L of 4 mol/L calcium chloride were added within 30 minutes, respectively, and the resulting mixture was allowed to be reacted. The reaction product was filtered, dried and ground.

[0036]

(Comparative Example)

To a 3-liter beaker, 1.5 L of tap water was added. After the water temperature was elevated to about 60°C, 225 g of quick lime was added under agitation to cause it to undergo a slaking reaction. Thereafter, the resulting mixture was agitated at 90°C for 30 minutes (the reaction temperature was increased to 90°C or higher by self-generating heat). After cooled, the mixture was passed through a 200-mesh sieve, filtered, dehydrated, dried and ground. The BET specific surface area and average secondary particle diameter are shown in Table 1.

[0037]

(Referential Example)

To a 3-liter beaker, 1.5 L of tap water was added. After the water temperature was elevated to about 60°C, 225 g of quick lime was added under agitation to cause it to undergo a slaking reaction. To the obtained calcium hydroxide solution, hydrated silicon dioxide (CARPLEX #80, SiO₂ content: 95 wt%) of Shionogi & Co.,

Ltd. was added in an amount corresponding to 0.5 wt% of calcium hydroxide yield as a silicon-based compound, and the mixture was agitated at 90°C for 30 minutes. After cooled, the mixture was passed through a 200-mesh sieve, filtered, dehydrated, dried and ground. The X-ray diffraction pattern of the obtained powder showed only calcium hydroxide. Therefore, it was found that calcium hydroxide compound formed of a solid solution with silicon dioxide was produced. The BET specific surface area and average secondary particle diameter are shown in Table 1.

[0038]

[Table 1]

Example No.	Type and Amount of Additive	Aging Conditions	BET Specific Surface Area (m ² /g)	Average Secondary Particle Diameter (μm)	Surface-treatment
1-1	Hydrated Silicon Dioxide, 0.3 wt%	90°C, 0.5 hour	28.3	3.50	Not Performed
1-2	Hydrated Silicon Dioxide, 0.5 wt%	90°C, 0.5 hour	30.8	3.31	Not Performed
1-3	Hydrated Silicon Dioxide, 1.0 wt%	90°C, 0.5 hour	35.8	2.95	Not Performed
2-1	Aluminum Gel, 2.5 wt%	90°C, 0.5 hour	15.0	6.32	Not Performed
3-1	Sodium Polyphosphate, 5.0 wt%	90°C, 0.5 hour	18.0	6.80	Not Performed
4-1	1 mol/1 Nitric Acid, 20 ml	90°C, 0.5 hour	8.6	3.83	Not Performed
4-2	1 mol/1 Hydrochloric Acid, 20 ml	90°C, 0.5 hour	9.5	3.79	Not Performed
5-1	Sodium Citrate, 1.0 wt%	90°C, 0.5 hour	30.0	2.38	Not Performed
5-2	Sodium Citrate, 2.0 wt%	90°C, 0.5 hour	28.3	2.57	Not Performed
5-3	Sodium Citrate, 3.0 wt%	90°C, 0.5 hour	22.0	2.71	Not Performed
5-4	Tartaric Acid, 1.0 wt%	90°C, 0.5 hour	23.0	2.55	Not Performed

[Table 1] (continued)

Example No.	Type and Amount of Additive	Aging Conditions	BET Specific Surface Area (m ² /g)	Average Secondary Particle Diameter (μm)	Surface-treatment
6-1	Hydrated Silicon Dioxide, 0.5 wt%	120°C, 2 hours	31.0	3.50	Not Performed
6-2	Hydrated Silicon Dioxide, 1.0 wt%	120°C, 2 hours	36.0	3.00	Not Performed
7-1	Hydrated Silicon Dioxide, 0.5 wt%	90°C, 0.5 hour	28.0	3.15	Performed
7-2	Sodium Citrate, 2.0 wt%	90°C, 0.5 hour	26.0	2.80	Performed
8	Hydrated Silicon Dioxide, 0.5 wt%	90°C, 0.5 hour	31.0	0.90	Not Performed
9-1	Hydrated Silicon Dioxide, 0.3 wt%	-	26.5	3.65	Not Performed
9-2	Hydrated Silicon Dioxide, 0.5 wt%	-	29.0	3.42	Not Performed
9-3	Hydrated Silicon Dioxide, 1.0 wt%	-	33.0	3.00	Not Performed
10	No. 3 Sodium Silicate, 26.4 mol	90°C, 0.5 hour	30.0	3.50	Not Performed
C.Ex.	Not Added	90°C, 0.5 hour	1.9	6.48	Not Performed
R.Ex.	Hydrated Silicon Dioxide, 0.5 wt%	90°C, 0.5 hour	7.0	5.02	Not Performed

C.Ex. : Comparative Example, R.Ex. : Referential Example

[Industrial Applicability]

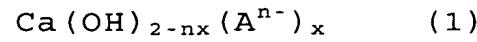
The calcium hydroxide of the present invention is expected to be used as an acid neutralizer or a halogen capturing agent.

[Title of Document] Abstract

[Abstract]

[Subject] The object of the present invention is to provide calcium hydroxide particles having a large specific surface area.

[Means of Solution] The present invention is calcium hydroxide compound represented by the following formula (1) :



(wherein n represents an integer of 1 to 4, x represents a number of 0.001 to 0.2, and A^{n-} represents an anion derived from at least one compound selected from the group consisting of a silicon-based compound, a phosphorus-based compound, an aluminum-based compound, an inorganic acid and an organic acid.)

[Selected Drawing] nil